SB
401
.C6
J17
1915

THE PHILIPPINE ISLANDS

COCONUTS

PANAMA PACIFIC
INTERNATIONAL EXPOSITION
SN. FRANCISCO CALIFORNIA

3 9015 00107 8511

THE UNIVERSITY OF MICHIGAN · LIBRARIES ·

COCONUTS IN THE PHILIPPINES

By H. O. Jacobson, *Chief, Division of Agronomy, Bureau of Agriculture*

THERE are 45,000,000 coconut palms in the Philippine Islands. The value of the crop vies with abacá (manila hemp) for second place in annual crop value.

The palms are widely distributed throughout the Archipelago, the vast majority of them, however, being found south of the city of Manila.

The coconut, though it has been of wonderful importance and utility to the tropical inhabitant as a source of food and drink, has recently assumed a position of great consequence to the entire world.

From the coconut is made a comestible oil—an oil that is clean, wholesome, bland, and free from acids and withal inexpensive. With the constantly rising costs of animal fats, the adoption of the use of vegetable oils becomes necessary, and for this purpose there is no source of supply that equals the coconut.

The habitat of the coconut palm.—These palms prefer low levels, yet are occasionally found thriving at altitudes of 1,500 to 2,500 feet. However, since they are very sensitive to low temperatures, high altitudes are not favorable.

A uniform temperature ranging between 60° and 90° F. is essential. In addition, a well-distributed rainfall of from 50 to 80 inches or more per annum is required.

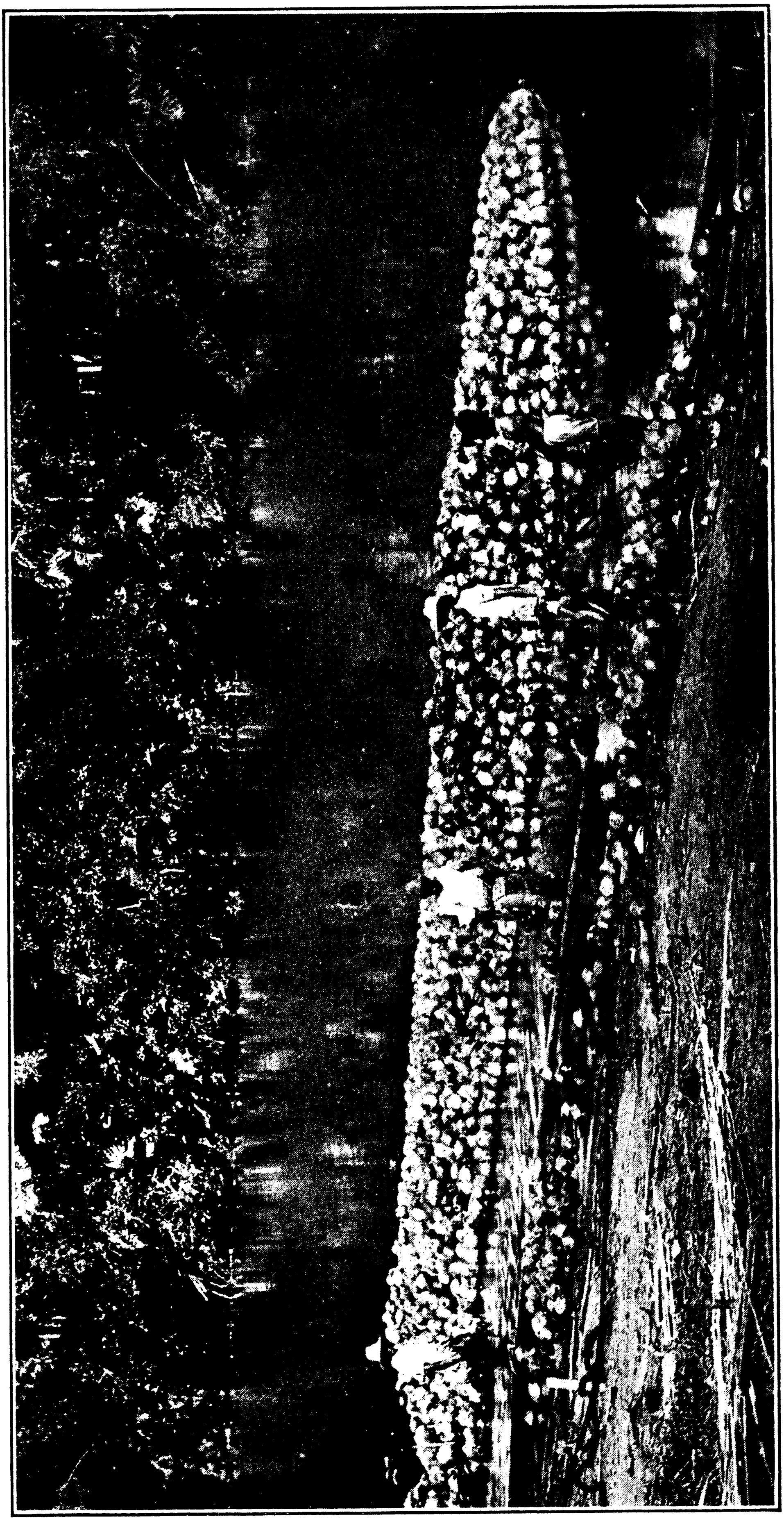
Soils.—Since the coconut palm does not have a taproot, nor do the lateral roots have root hairs, it therefore appears that a suitable soil must be friable, retentive of moisture, and highly fertile in order to secure normal development. The most productive groves are found on littoral or alluvial soils, yet this does not signify that comparatively heavy soils are not suitable, since with proper management these can be made to comply with all the above requirements. In the case of coconuts now found on heavy soils, there is seldom any effort made to provide for soil aëration, cover, or protection from unfair competition for plant food, due to weed growth.

The old superstition that the coconut must be near the sea is now exploded, but the belief is founded on apparently good reasons, which, however, have been found to be due to other causes than those which have been duly credited.

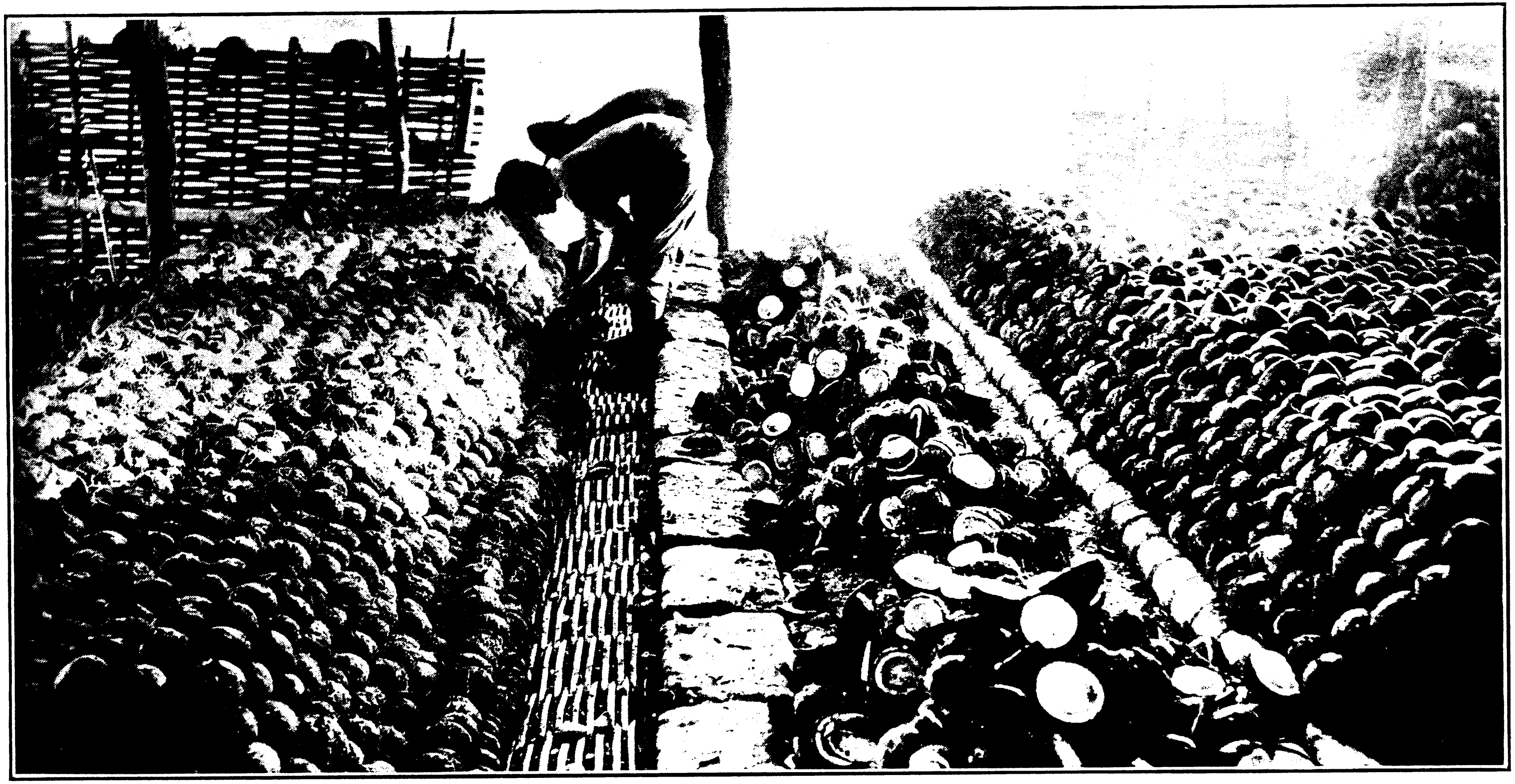
The coconut is sensitive to water supply, and naturally littoral soils are abundantly provided with soil water passing from the higher inland levels to the seashore, consequently

One-year-old palm properly treated.

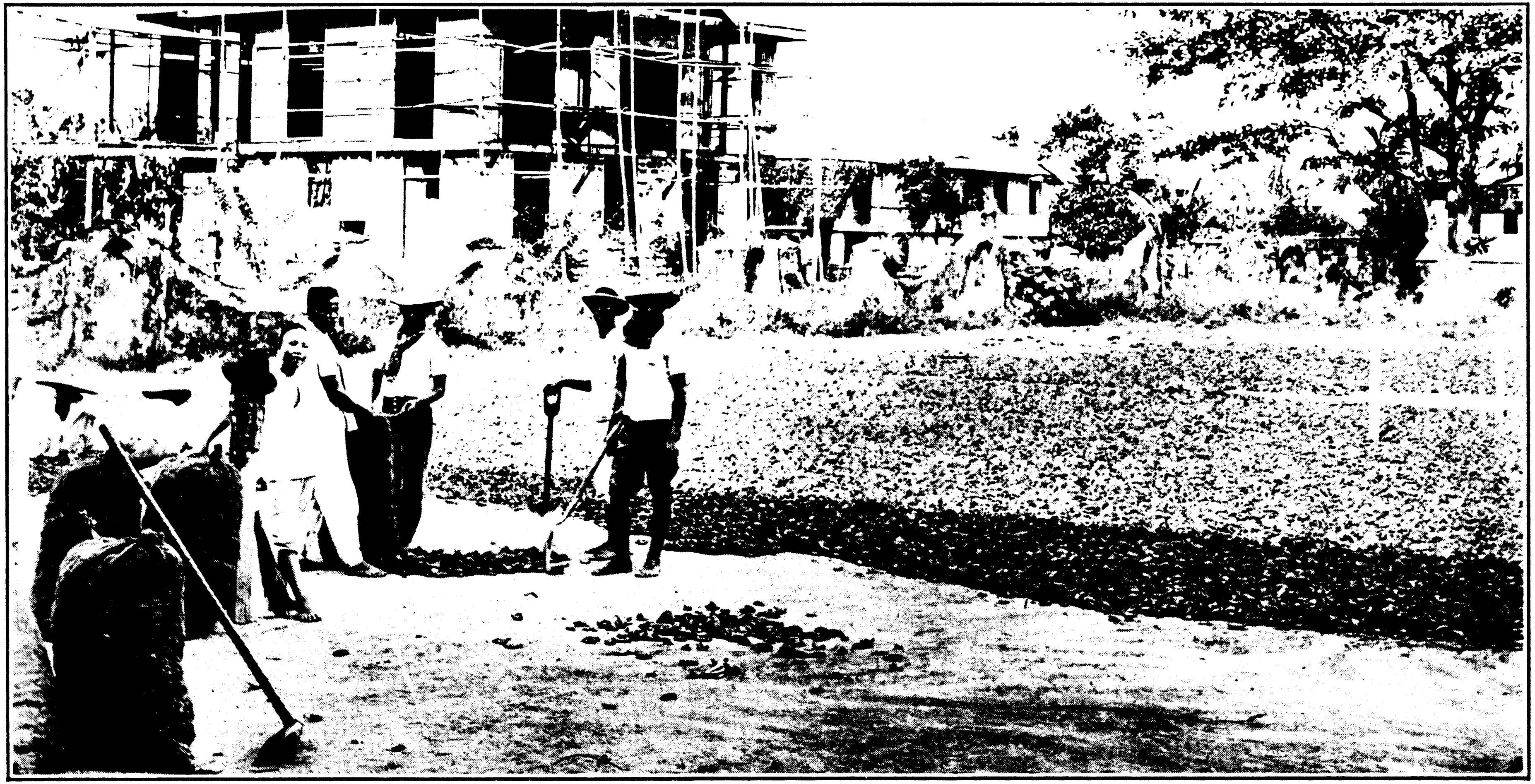
easily available to the roots of the coconut palms, hence the vigorous growth. Nevertheless, when free soil-water movement is found inland at low levels, and with favorable



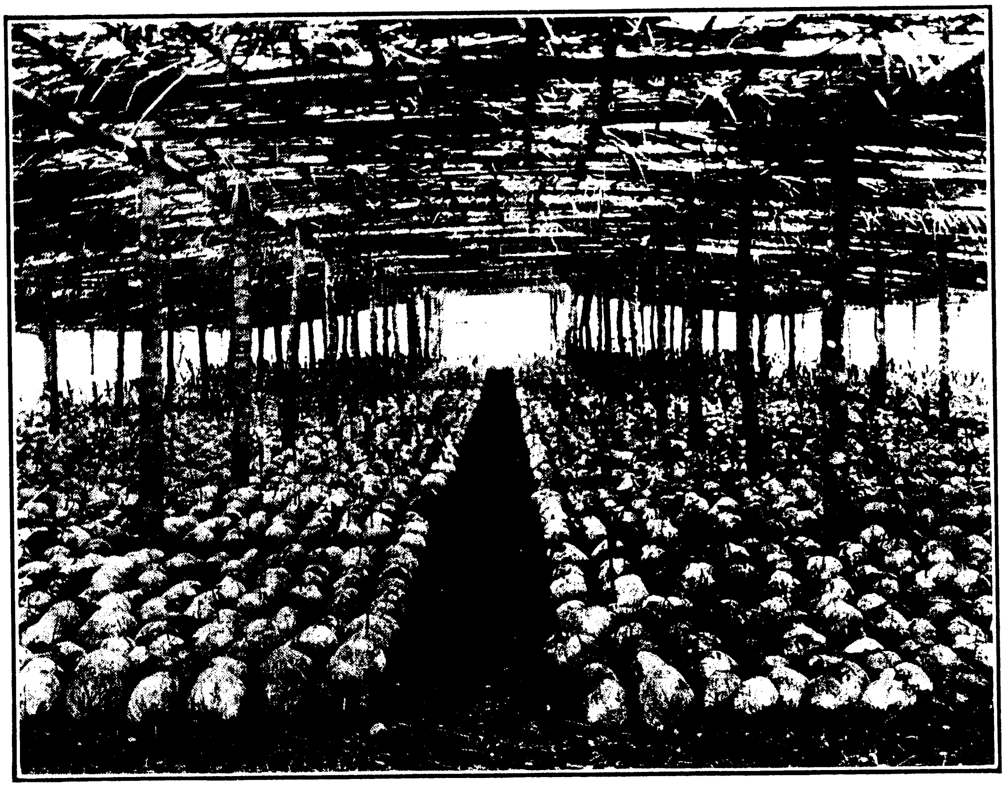
Coconut raft.



Preliminary drying in making copra—tapahan method.



Sun-drying copra.



Coconut propagation.

temperatures and sufficient drainage, equally high development and productivity may be obtained.

Planting.—A complete description of the coconut industry

Coconut grove 25 years old.

would fill a book. Indeed, volumes have already been written. For our purpose it will serve to briefly describe ordinary methods.

Seed nuts should be selected from highly productive trees of good types. When ripe, these selected nuts should be carefully lowered to the ground. The nuts (retaining husks) are then placed in partly shaded seed beds or nurseries where they can be kept uniformly moist until germination takes place and sufficient plant growth is attained to allow their being placed in a permanent location.

The fields are prepared by removing the forest trees, underbrush, etc., then thoroughly plowing and fitting the field. Often, however, no plowing is done.

Lines are then laid and holes dug either according to the triangle, quadrangle, or quincunx plan, allowing about 50 palms to the acre. Native methods consist of more or less hit-and-miss planting with insufficient spacing, many plantations having as many as 200 palms per acre.

There is considerable difference of opinion as to the proper age at which seedlings should be set out, method of handling in that operation, and size of hole to be dug, etc. The practical planter must draw his own conclusions and pass judgment. Any progressive person can readily secure all the prevailing modern ideas on the subject.

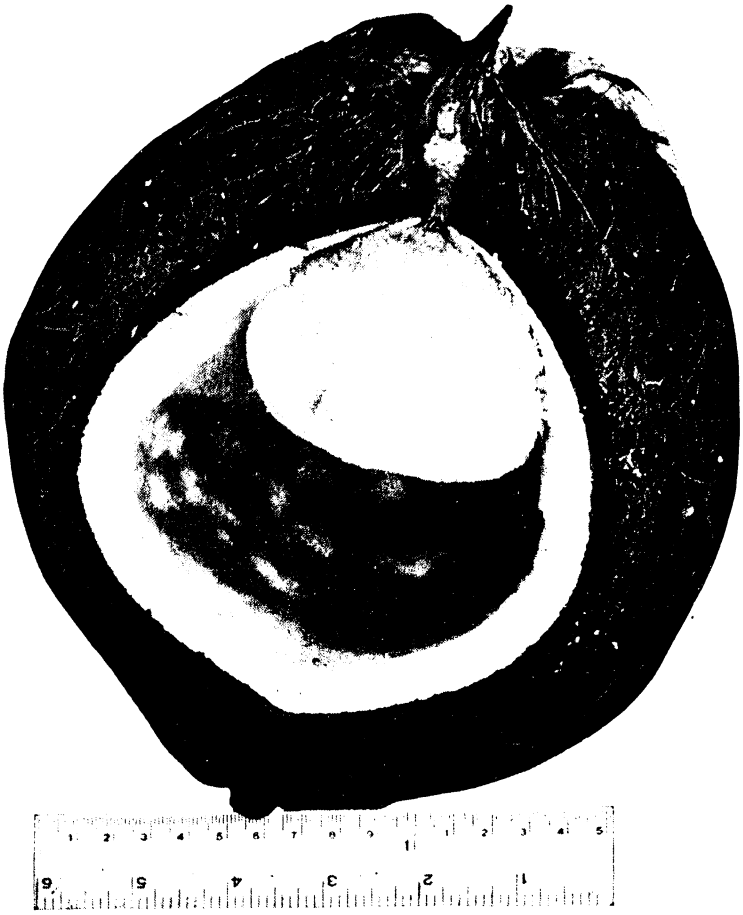
Culture.—Generally, culture has merely extended to cutting down the underbrush, even omitting this feature at times.

With the growth of the industry, however, modern agronomic practices are being introduced and in time more intensive culture with fertilization will be the rule, not the exception. The coconut palm responds handsomely to good treatment.

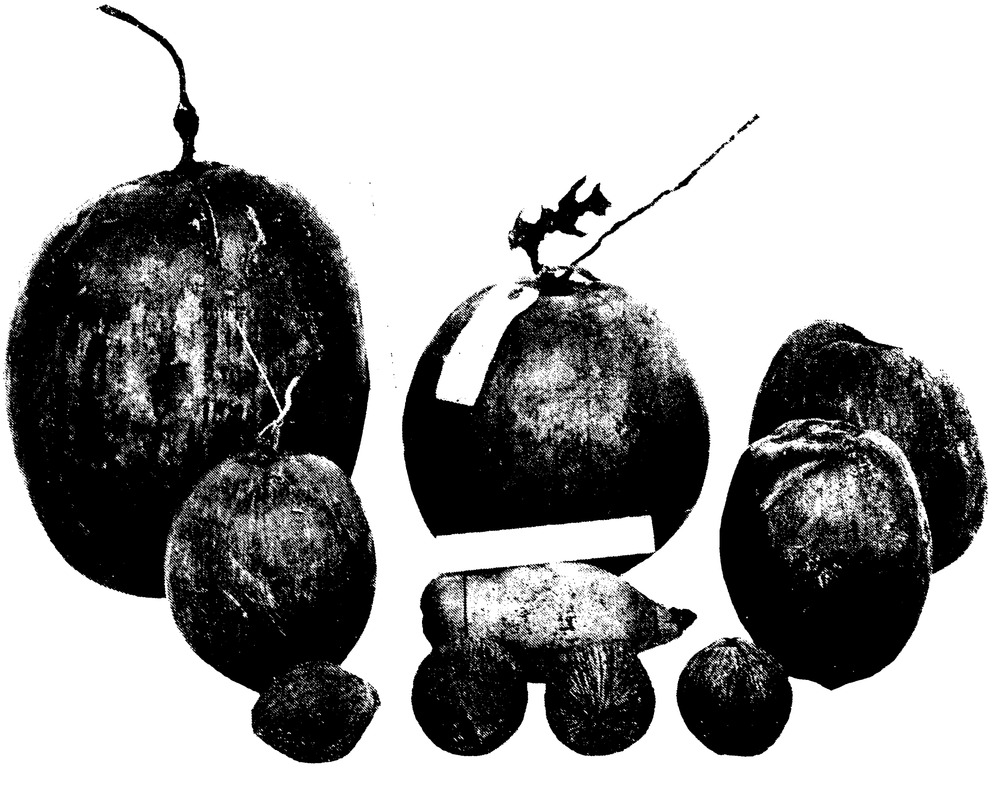
Harvesting.—When the nuts are mature they are either removed by hand, the harvester climbing the trunk of the palm, or by means of a hook attached to a long bamboo pole, by which the nuts are removed one by one. Another method, and one to be condemned, consists of cutting off the entire spathe or stem with the nuts attached, by means of a sharp curved cutting blade fastened to a long bamboo pole.

The nuts are then husked, removing the thick fibrous covering. This work may be done before the crop is removed from the grove or at the place where the nuts are further treated in manufacture. The husking is accomplished with the aid of a native plowpoint set in a tripod.

All the nuts not intended for direct consumption as food



Sprouting coconut.



Coconut varieties.

are made into copra (coconut meat partly dried). When the nuts are husked they are split open by means of a bolo (long, heavy-bladed knife) and subjected to heat sufficient to partly shrink the layer of meat away from the shell. Then the meat is removed from the shell and further dried.

Two methods of drying prevail in the Philippines; one is drying in the sun and the other by means of open fires in pits over which wooden gratings are placed. The copra is placed on the gratings and dried until the greater portion of its natural moisture content is removed. The open-fire method is objectionable, due to the deposit of creosote on the copra. The sun-drying method is fairly satisfactory, but unfortunately a climate highly desirable for producing coconuts is not suitable for drying copra. A standard machine for artificially drying copra has not yet been developed, but the problem is far from being insurmountable. The requirements of such a machine are controllable temperature, not to exceed 130° to 150° F., rapid removal of moisture, ease of manipulation, durability, and very low operating cost.

Sprouted coconut.

Copra is now made at extremely low cost for operation.

Under any scheme the shells should and will supply the necessary fuel.

It should be stated here that there are extant several styles of machines or apparatus for drying copra.

Transportation.—Because of the fact that the coconut plantations naturally are located contiguous to the sea, lakes, or rivers, the problem of transportation is quite easily solved. With the extension of railroads and metaled highways, which has taken place within recent years, considerable improvement has followed.

The coconuts (unhusked) are sometimes made into rafts and floated to market.

Markets.—Sixteen years ago but little attention was given here to the preparation of copra and the Spanish records make no mention of it as an export.

The following figures, taken from the reports of the Collector of Customs, indicate the growing importance of the product:

Export of copra

[Values in U. S. currency.]

Fiscal year—	Quantity.	Value.	Average value per metric ton.	Percentage of total exports.
	Met. tons.			
1899	14,047	$656,870	$46.76	4.7
1900	37,081	1,690,897	45.60	7.8
1901	52,530	2,648,305	50.42	10.0
1902	19,687	1,001,656	50.88	3.6
1903	97,630	4,472,679	45.81	11.2
1904	54,133	2,527,019	46.68	7.0
1905	37,557	2,095,352	55.79	5.6
1906	66,158	4,043,115	61.11	12.3
1907	49,082	4,053,193	82.58	11.8
1908	76,420	5,461,680	71.47	16.6
1909	105,565	6,657,740	63.07	21.1
1910	115,285	9,153,951	79.40	22.9
1911	115,602	9,899,457	85.63	24.9
1912	169,342	16,514,749	97.52	32.8
1913	113,055	11,647,898	103.03	21.9

NOTE.—The drought of 1912 affected the output of 1913. Also the opening of a large modern oil plant consumed a considerable quantity of copra which, therefore, does not appear on record as export under this heading.

One metric ton equals 2,204.62 avoirdupois pounds.

It is estimated that not less than 150,000,000 nuts are consumed annually for food. This amount, if converted into copra, would augment the figure by 30,000 metric tons, estimating that it requires 5,000 coconuts to produce 1 metric ton of copra.

About 50,000,000 nuts are made into oil in small antiquated mills operated by Chinamen and Filipinos and by home manufacture. In 1913 about 4,600 tons of oil were produced, of which 1,300 tons were exported. This oil is utilized for numerous purposes locally.

Approximately 250,000 palms are devoted to the production of tuba (fermented palm sap), of which over 11,000,000 gallons were produced in 1913. This product was valued at more than $1,000,000, the average price being $0.09½ per gallon.

Distribution of exported copra.—In the 1913 report of the Collector of Customs of the Philippine Islands we find that but 6.5 per cent of the copra went to the United States; other countries participated as follows:

Export of copra by countries, 1913

	Per cent.
United States	6.5
United Kingdom	2.2
Germany	13.5
France	60.9
Spain	8.1
Belgium	4.3
Denmark	.9
Mexico	.2
Japan	.7
British East Indies	2.7
Total	100.0

Desiccated coconut is not prepared in the Philippine Islands.

Production.—The leading coconut provinces, Tayabas, Laguna, Moro, Samar, Albay, Capiz, Misamis, Leyte, and Cebu, produce 80 per cent of the yearly crop. The first five provinces produce 60 per cent of the total. The total production for the Philippine Islands in 1914 will exceed 1,000,000,000 nuts.

The limit of production of coconuts on large areas has not yet been determined. A coconut palm sometimes bears a few nuts at 4 years of age, but worth-while crops will seldom be secured before the seventh year.

Mr. O. W. Barrett, formerly chief, division of horticulture in the Philippine Bureau of Agriculture, estimated that under good management production might be expected as follows:

	Nuts per palm.
Fifth year	10
Sixth year	40
Seventh year	60
Eighth year	80
Ninth year	100

Production per tree in the Philippines will probably not exceed 30 nuts per annum. This is due to too close planting and lack of culture and fertilization.

Individual palms are found, it is said, that produce 200 or more nuts per annum.

Tuba production.—From those palms devoted to the tuba industry the sap from the unopened flower buds is collected once or twice daily, the operator climbing a palm with a receptacle on his back and collecting the accumulated flow from each palm which is caught in a small bamboo-joint bucket attached to each bud. He passes from palm to palm on bamboo aërial walks and descends when the tour is completed.

This sap, when fresh, is a palatable drink and is sold locally as a beverage. The fresh sap contains about 12 per cent of sugar. When fermented, the product is highly intoxicating.

The average palm is supposed to produce 47.5 gallons of tuba per annum, valued at $4.50. Thus, 1 acre of 50 palms devoted to tuba production would yield $225, while if devoted to copra production would yield 5,000 nuts, or 1 ton of copra worth, at prices prevailing before the European war began, about $110. Of course, palms producing tuba do not at the same time yield coconuts.

By-products.—The most important by-product is the copra cake or "poonac," the residue from the presses when oil is made. This material contains from 2 to 6 per cent oil or more and is in great demand in Europe for stock food.

Very little coir fiber is made here as yet, although there is abundant raw material (coconut husks). This industry, however, requires very low labor costs in order to produce profits, and unless taken up as a household industry will probably not be a feature of consequence.

While the Filipino utilizes every part and portion of the coconut palm, aside from the fruit no other part of it has as yet any considerable value or commercial importance.

The potential possibilities of the fruit are so great and so little developed, comparatively speaking, that by-products need scarcely be considered.

Diseases, pests, and enemies.—When compared with other coconut-producing countries, the Philippine Islands are remarkably free in this respect. It is not the intention to convey the idea that diseases and pests are unknown, but all of those present can be handled and controlled, and as yet no general serious damage has been experienced.

Miscellaneous.—A freak coconut is known locally as "Macapuno." The Filipino distinguishes it by its heavier weight. These nuts, instead of being partly filled with "milk" when ripe, are more or less filled with "meat," which is devoid of the fibrous character of the normal coconut meat. This material is popular for making confections or desserts.

Coconuts ripen throughout the year.

Harvesting is done at periodic intervals, varying slightly from eight to twelve weeks. Six harvests per annum are considered quite sufficient.

A good laborer can husk 1,200 to 1,500 nuts per day, or can split three times that number.

There is one modern coconut-oil manufacturing plant now in operation in Manila; it is proposed to build another in Cebu in the near future.

Differing authorities estimate that the Philippines produce one-fourth to one-third of the world's copra output.

An estimate upon expenses for establishing a copra central on a plantation of 5,000 hectares (12,000 acres), prepared by Mr. O. W. Barrett, formerly chief, division of horticulture, Philippine Bureau of Agriculture, follows:

"In view of the fact that there is a strong and growing interest in coconut culture in the Philippine Islands, and at the same time a tendency to form combinations of plantations, or 'copra centrals,' it would seem expedient to furnish detailed estimates of the cost of establishing such centrals or large estates here.

"Unfortunately, it is practically impossible for the prospective coconut planter to lease or purchase bearing plantations anywhere in the Philippine Islands at present; on the other hand, there are unquestionable advantages and facilities in the way of his acquiring large areas suitable for the establishment of modern coconut groves.

"In this connection it should be borne in mind that while a small plantation may cost disproportionately high in the preparatory stage, larger estates cost relatively much less per hectare, both in the operating expenses and, if well managed, in the overhead charges. The returns from a copra central of, say, one-fourth or one-tenth the size of that under consideration in the following memorandum, should be only a little less, proportionately, than those from the large centrals. Just as with sugar cane, for instance, a certain amount of momentum, as it were, must be acquired by means of capital before the potential profitableness inherent in the system will be in evidence.

"The following estimates are based upon data gathered from reliable sources and are believed to be well within the limits of practicability. The figures here given are for a plantation in moderately good soil situated anywhere in the Philippine Islands outside of the typhoon belt.

"It is understood that 1,000 hectares (2,400 acres) of land are to be cleared the first year, 200 acres (480 acres) of this being set with abacá and 500 hectares (1,200 acres) with coconuts, 300 hectares (720 acres) being left for the central plant, roadways, villages for laborers, pastures, gardens, etc. The second year 2,000 hectares (4,800 acres) are to be cleared, and one-half planted with abacá (manila hemp) and one-half with coconuts. During the third and also during the fourth years 1,000 hectares (2,400 acres) are to be cleared and planted with coconuts. The trees are to be set in 'block' system (i. e., rows alternating 8 by 10 meters, or 20 by 32½ feet), 125 to the hectare (50 per acre).

Items of plant

Main office building (furnished)	$2,500.00	
Bungalow for—		
Director	1,500.00	
Agronomist	1,250.00	
Field superintendent	1,250.00	
Bungalows for 3 assistants, at $500 each	1,500.00	
300 cottages for laborers, at $37.50 each	11,250.00	
Warehouse	1,500.00	
2 churches, at $500 each	1,000.00	
4 schoolhouses, at $375 each	1,500.00	
3 tool houses	750.00	
Machine shop and storehouse	1,500.00	
Commissary building	2,000.00	
Hospital with furnishings	1,500.00	
50 kilometers woven-wire fence	10,000.00	
Tools and equipment including 3 traction engines, 6 donkey engines with drums, 12 complete stump pullers, 50 field harrows, 50 ordinary plows, 1 motor launch, and minor implements (axes, bolos, shovels, etc.)	37,500.00	
Work animals, including 50 carabaos, 100 cattle, 10 horses	12,500.00	
Live stock, including 200 brood sows and 10 boars	1,500.00	
Commissary goods and store stock	2,500.00	
Ice plant	1,500.00	
Water supply	2,500.00	
Dock and freight bodega (warehouse)	2,500.00	
		$99,500.00

Operating expenses, first year

Salaries of director, agronomist, superintendent, and assistants, including medical inspector, accountant, cashier, machinist, storekeeper, and assistants	$25,000.00		
Labor, 300 men, at $0.375 per day, with partial subsistence, averaging 20 days per month	30,000.00		
65,000 selected seed nuts	1,625.00		
220,000 abacá suckers, at $30 per 1,000 (delivered)	6,600.00		
Miscellaneous supplies	5,000.00		
General maintenance of plant	5,000.00		
Road construction	2,500.00		
Fence building	2,500.00		
Depreciation of stock and renewal of small items	5,000.00		
Interest on $500,000 at 4 per cent	20,000.00		
		$103,225.00	
Total for plant and first year's expenses		202,725.00	

Operating expenses, second year

Salaries	$30,000.00		
Labor	50,000.00		
130,000 seed nuts	3,250.00		
1,100,000 abacá suckers	33,000.00		
Miscellaneous supplies	12,500.00		
General maintenance of plant	7,500.00		
Fence construction	2,500.00		
Depreciation of stock and renewal of small items	7,500.00		
Interest on $500,000	20,000.00		
		$166,250.00	
Total expenses to end of second year			$368,975.00

Operating expenses, third year

Salaries	$35,000.00		
Labor	37,500.00		
130,000 seed coconuts	3,250.00		
Miscellaneous supplies	10,000.00		
General maintenance	10,000.00		
Fence construction	2,500.00		
Additional buildings including laborers' cottages, etc	5,000.00		
Depreciation of stock and renewal of small items	7,500.00		
Interest on $500,000	20,000.00		
		$130,750.00	

INCOME

110 tons of abacá, at $200	22,000.00		
Pigs	7,500.00		
		29,500.00	
			$101,250.00
Total expenditures to end of third year			470,225.00

Operating expenses, fourth year

Salaries	$37,500.00		
Labor	37,500.00		
130,000 seed coconuts	3,250.00		
4 artificial dryers for copra, at $5,000	20,000.00		
Miscellaneous supplies	7,500.00		
General maintenance	7,500.00		
Fence construction	1,500.00		
Depreciation	7,500.00		
Interest on $500,000	20,000.00		
		$142,250.00	
INCOME			
220 tons abacá (from 480 acres)	44,000.00		
550 tons abacá (from 2,400 acres)	110,000.00		
Pigs	10,000.00		
		164,000.00	
Net gain during fourth year			$21,750.00
Total expenditures to end of fourth year			448,475.00

Operating expenses, fifth year

Salaries	$37,500.00		
Labor	37,500.00		
Miscellaneous supplies	7,500.00		
General maintenance	7,500.00		
Depreciation	7,500.00		
Interest	20,000.00		
		$117,500.00	
INCOME			
1,320 tons abacá (full crop)	264,000.00		
Pigs	12,500.00		
625,000 coconuts from grove "A" (first 1,200 acres, 62,500 trees, 10 nuts per tree)	12,500.00		
		289,000.00	
Credit balance for fifth year			$171,500.00
Total net expenditures to end of fifth year			276,975.00

Operating expenses, sixth year

Salaries	$40,000.00		
Labor	37,500.00		
Supplies	10,000.00		
Maintenance	10,000.00		
Depreciation	10,000.00		
Additional buildings and laborers' cottages	10,000.00		
Interest	20,000.00		
		$137,500.00	
INCOME			
1,320 tons abacá	264,000.00		
Pigs	12,500.00		
2,500,000 coconuts from grove "A" (first 1,200 acres, 62,500 trees, 40 nuts per tree)	50,000.00		
1,250,000 coconuts from grove "B" (first 2,400 acres, 125,000 trees, 10 nuts per tree)	25,000.00		
		351,500.00	
Credit balance for sixth year			$214,000.00
Total debit balance at end of sixth year			62,975.00

Operating expenses, seventh year

Salaries	$40,000.00		
Labor	37,500.00		
Supplies	10,000.00		
Maintenance	10,000.00		
Depreciation	10,000.00		
Narrow-gauge car tracks and rolling stock	12,500.00		
Interest on $500,000	20,000.00		
		$140,000.00	

INCOME

1,320 tons of abacá	264,000.00		
Pigs	12,500.00		
3,750,000 nuts from grove "A" (62,500 trees, 60 nuts per tree)	75,000.00		
5,000,000 nuts from grove "B" (125,000 trees, 40 nuts per tree)	100,000.00		
1,250,000 nuts from grove "C" (125,000 trees, 10 nuts per tree)	25,000.00		
		476,500.00	
Net return, seventh year			$336,500.00
Credit balance at end of seventh year			273,525.00
20 per cent dividend			100,000.00
Sinking fund			173,525.00

Operating expenses, eighth year

Salaries	$42,500.00		
Labor	40,000.00		
Extension of drying plants	20,000.00		
Supplies	12,500.00		
Maintenance	12,500.00		
Depreciation	10,000.00		
Interest	20,000.00		
		$157,500.00	

INCOME

1,320 tons of abacá	264,000.00		
5,000,000 coconuts from grove "A" (62,500 trees, 80 nuts per tree)	100,000.00		
7,500,000 coconuts from grove "B" (125,000 trees, 60 nuts per tree)	150,000.00		
5,000,000 coconuts from grove "C" (125,000 trees, 40 nuts per tree)	100,000.00		
1,250,000 coconuts from grove "D" (125,000 trees, 10 nuts per tree)	25,000.00		
Interest on sinking fund	6,941.00		
		645,941.00	
			$488,441.00
Credit balance for eighth year			661,966.00
Repayment of principal			500,000.00
			161,966.00
20 per cent dividend			100,000.00
Sinking fund			61,966.00

Operating expenses, ninth year

Salaries	$42,500.00		
Labor	40,000.00		
Supplies	12,500.00		
Maintenance	12,500.00		
Depreciation	10,000.00		
		$117,500.00	

INCOME

1,320 tons of abacá	264,000.00		
6,250,000 nuts from grove "A" (100 nuts per tree)	125,000.00		
10,000,000 nuts from grove "B" (80 nuts per tree)	200,000.00		
7,500,000 nuts from grove "C" (60 nuts per tree)	150,000.00		
5,000,000 nuts from grove "D" (40 nuts per tree)	100,000.00		
Interest on $61,966	2,478.50		
		841,478.50	
			$723,978.50
Credit balance at end of ninth year			785,944.50
60 per cent dividend			300,000.00
Sinking fund			485,944.50

Operating expenses, tenth year

Salaries	$45,000.00		
Labor	40,000.00		
Supplies	12,500.00		
Maintenance	15,000.00		
Depreciation	10,000.00		
4 new drying plants	100,000.00		
2 copra steamers	150,000.00		
		$372,500.00	

INCOME

990 tons abacá (¾ full crop)	198,000.00		
6,250,000 nuts from grove "A" (100 nuts per tree)	125,000.00		
12,500,000 nuts from grove "B" (100 nuts per tree)	250,000.00		
10,000,000 nuts from grove "C" (80 nuts per tree)	200,000.00		
7,500,000 nuts from grove "D" (60 nuts per tree)	150,000.00		
Interest on $485,944.50	19,437.50		
		942,437.50	
		372,500.00	
			$569,937.50
			1,055,882.00
150 per cent dividend			750,000.00
Sinking fund			305,882.00

Operating expenses, eleventh year

Salaries	$50,000.00		
Labor	45,000.00		
Supplies	17,500.00		
Maintenance	15,000.00		
Depreciation	20,000.00		
		$147,500.00	

INCOME

990 tons abacá (¾ crop)	$198,000.00		
31,250,000 nuts from 312,500 trees	625,000.00		
10,000,000 nuts from grove "D" (80 nuts per tree)	200,000.00		
Interest on $305,882	12,235.00		
		$1,035,235.00	
			$887,735.00
			1,193,617.00
200 per cent dividend			1,000,000.00
Sinking fund			193,617.00

Operating expenses, twelfth year

Salaries	$60,000.00	
Labor	45,000.00	
Supplies	25,000.00	
Maintenance	20,000.00	
Depreciation	25,000.00	
		$175,000.00

INCOME

43,750,000 nuts (from 437,500 trees)	875,000.00		
990 tons abacá (¾ crop)	198,000.00		
Interest on $193,617	7,744.50		
		1,080,744.50	
		175,000.00	
			$905,744.50
			1,099,361.50
200 per cent dividend			1,000,000.00
Sinking fund			99,361.50

"The preceding figures are based upon the assumption that the land to be brought under cultivation is moderately forested and so located that transportation facilities are fairly favorable. Expenses for clearing will of necessity vary considerably according to the nature of the land; for instance, the expenses of clearing 4,800 acres in the second year may cost more than the $50,000 estimated, or in fact on heavily forested ground it *might* be necessary to double this amount. On the other hand, it is expected, as a matter of course, that the most suitable land of the entire area would be selected for the scene of operations in the busy second year, and all economy in the way of plowing and treatment of interspaces would be given the best attention; in other words, to save expenditures which could be carried over in part, at least, into the third and fourth years' expenses, the coconuts transplanted in the 2,400 acres to be planted in this crop, will be given only a reasonable amount of care, merely a fair amount of space around each tree being kept in good condition of tilth. During the third and fourth years the interspaces in the first fields are gradually reduced to the state which permits the cultivation of corn as a catch crop.

"By the same token, it is not necessary and is not considered good economy to bring into the 'fallow' condition more than a moderate proportion of the area cleared during the first and second years. Both abacá and coconuts succeed splendidly on ground that is newly 'brought in,' provided a small area immediately about the young plants is kept friable and free from weeds and grass; thus the plowing expense item can be kept down to a very low figure.

"Corn planting should proceed gradually, as a coconut catch crop; it would quite likely be advisable to plant one or two crops of corn in the abacá plantation; any surplus grain not needed for the pig stock will find a ready local market.

"Should large areas of more or less level ground free from heavy stumps be encountered, it *might* be well to purchase one or two sets of the cable-system steam plows; this would mean an extra expenditure during the first or second years, presumably, of about $20,000 for each set.

"The office building can be furnished at once with modern office fixtures including an (expensive) safe, and imported equipment, or these expenditures can be arranged for gradually as the business increases.

"If it should be found necessary to use a small locomotive on narrow-gauge tracks for hauling nuts to and copra from the dryers and for other similar transportation services an extra $25,000 to $50,000 might be required.

"Theoretically, an oil plant should be established in conjunction with a plantation of this magnitude; the estate would then become a *coconut-oil* instead of a copra central. The expense in drying the 'meat' would be obviated by turning the nuts directly into oil. The operation of the oil plant would call for a very heavy expenditure (perhaps $500,000 or more) for oil containers for long distance shipment; by the same token, this plant might or might not, according to local conditions, avoid the necessity of purchasing the freight steamers to handle the more bulky copra.

"If the topography is very uneven more expense may be entailed in the fencing and road-making operations, the construction of buildings, etc. It might be well to add, even in the first year, several subsidiary commissary depots; once constructed, however, these should be self-supporting, the receipts always going back into supplies, and the low profits amply covering all operating expenses and permitting a moderate increase of stock.

"Under some circumstances the corn-pig system may be impracticable. For quick and good returns, however, abacá will be found, in nearly every case, to be an indispensable secondary crop.

"Briefly speaking, the labor expenditures, at least for the first two years, may be increased, if conditions are *not* moderately good, by 50 to 100 per cent. Expenditures for machinery, buildings, etc., may also be increased during the first three years, through more or less adverse conditions, by 25 to 50 per cent.

"On the other hand, however, it is believed the income from both coconuts and abacá is put well below the normal outturn of an estate of this size managed according to the approved methods of modern agronomy. The present price of coconuts is (according to the locality) 10 to 20 per cent higher than the rate allowed in these figures.

"The abacá receipts will fall to about one-half full crop in the thirteenth, fourteenth, and fifteenth years. At about the fifteenth year the 2,880 acres of abacá should be grubbed up and planted in coconuts.

"Speaking of the *average conditions* in India, Simmonds[1] states:

" 'Spathes or shoots, from which eventually the flowers are to appear, will begin to make their appearance in the sixth year, but some kinds of coco palm, as the Nicobar, even before this. * * * The produce of the tree in full health and properly tended is much dependent on soil and climate. The average may be put down at 120 nuts in the twelve months, while in a low and sandy soil it will amount to 200.'

"Although many trees in the well-kept grove will yield 200 nuts, and some even 300 (the record being, it is believed, about 470), it would not be safe to count upon more than 125 to 150 per tree *on the average* 'year in and year out.'

"The trees are in their prime at the twentieth to the fortieth years and keep up without much change to about the sixtieth or eightieth year, i. e., the annual dividend will be from 150 to 250 per cent till about the one hundredth year.

"It is therefore obvious that coconuts are not only the safest but probably the most profitable tropical crop in the world.

"The following tables from 'Coconut Growing in the Philippine Islands,' by the Honorable Dean C. Worcester, formerly Secretary of the Interior, Government of the Philippine Islands, will supply figures for establishing a small plantation:

---

[1] **Simmonds, Tropical Agriculture.**

" 'ESTIMATED COST OF ESTABLISHING A 2,500-ACRE COCONUT PLANTATION ON RENTED PUBLIC LAND

" 'The following is a statement of the approximate cost of establishing a 2,500-acre coconut plantation and of the revenues which should be derived therefrom at practically the existing market price of copra. It should be remembered, however, that properly dried copra will unquestionably bring a price materially in advance of that commanded by the smoked and imperfectly dried article which at present makes up the bulk of the Philippine product.

" 'This estimate is based on clearing half of the land the first year and half the second year. Two hundred acres of land are reserved for buildings and other purposes. A more liberal allowance is made for the cost of clearing the land and preparing it for planting than is called for by the estimates hereinbefore quoted and as the returns from catch crops will manifestly depend directly on the character of the soil selected and on the efficiency of the administration of the estate, no allowance is made for them.

" 'Practical experience has shown that under capable administration, with favorable soil and market conditions, they may be made to pay the cost of clearing and planting the land and that of keeping it clean during the first two or three years after it is cleared. I am of the opinion that if this is done it is all that can be expected and I doubt somewhat whether it would be feasible to achieve this result on a coral island. Nevertheless, if I myself were selecting a site for a coconut plantation, I should select one on a coral island which was pretty well isolated in order to avoid possible danger of insects and other pests which might result from the fact the neighboring plantations, if any existed, were badly cared for.

FIRST YEAR

	On ordinary forest land.	On a coral island.
Survey	$250.00	$75.00
Rental	256.00	256.00
Clearing and plowing 1,250 acres, at $20 per acre	25,000.00	
Clearing 1,250 acres, at $10 per acre (plowing not necessary)		12,500.00
Cost of seed	1,656.25	1,656.25
Planting 33,000 nuts, at $0.02½ each	825.00	825.00
Fencing	1,000.00	

FIRST YEAR—Continued

	On ordinary forest land.	On a coral island.
Assistant manager's salary	$1,800.00	$1,800.00
Assistant manager's house	1,000.00	1,000.00
Laborers' quarters	2,000.00	2,000.00
Storehouse for rice, tools, trade goods, etc	500.00	500.00
Well, tank, pumping engine, and pipe for water supply	600.00	600.00
1 mile of track (rail, 12 pounds to yard)	765.00	765.00
5 cars, at $30 each	150.00	150.00
Tools	500.00	500.00
15 draft cattle, at $40 per head	600.00	600.00
1 American or Australian horse	150.00	150.00
2 native ponies, at $50 each	100.00	100.00
One 30-foot launch 10-horsepower petroleum engine	1,500.00	1,500.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Total	39,302.25	25,627.25

NOTE.—A launch is estimated for because unless the plantation is located directly on some interisland harbor one will be necessary in keeping up communication between the plantation and the nearest port. A liberal estimate has been made for quarters for men, which would allow of putting up a substantial shed, with galvanized-iron roof. It would give the men good quarters and could later, at small additional expense, be converted into a drying shed, while the iron roof would be useful for catching rain water, especially on coral islands. A good well, with a pump, tank, and pipe, is essential in order to provide adequate bathing facilities for the assistant manager and men, and water for animals, sprouting nuts, etc.

It would probably be necessary to run a small store in connection with a plantation at which articles of common necessity should be sold at Manila prices, plus 20 per cent, plus cost of transportation, but labor should be paid for in cash and the men left free to trade at the store or not, as they please.

From the total should be deducted the receipts from catch crops, if any, and from the sale of timber and firewood, which on forest land might somewhere nearly cover the cost of clearing and planting. The sandy soil of coral islands will grow pineapples, peanuts, cassava, corn or yams, but as weeds do not spring up readily on this soil and as comparatively little work is required to keep it clean, it might be more desirable not to plant catch crops but to leave all plant food in the soil for the coconut trees.

It will be noted that I have provided for an assistant manager only. It would be necessary to have one competent man constantly on the ground. There would be necessity for work in other places in connection with the purchase and shipment of supplies, seed nuts, etc., and the securing of laborers, which should be performed by a manager, and the best way to provide for this unless the owner himself cares to do it would be to have one thoroughly competent man who would serve as general manager for several plantations and who would not only perform the work above referred to but would visit and inspect the plantations at frequent intervals. If the assistant manager proves capable, his salary should be raised $200 per year until it reaches at least $3,000.

SECOND YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Clearing and plowing 1,250 acres, at $20 per acre	25,000.00	
Clearing 1,250 acres, at $10 per acre (plowing not necessary)		12,500.00
Cleaning 1,250 acres of land already planted, at $10 per acre	12,500.00	
Cleaning 1,250 acres of land already planted, at $5 per acre		6,250.00
Planting 33,000 nuts, at $0.02½ each	825.00	825.00
Fencing	1,000.00	
40 laborers' houses, at $25 each	1,000.00	1,000.00
Assistant manager's salary	2,000.00	2,000.00
Tools	400.00	400.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Depreciation on buildings, track, and water system (10 per cent)	451.50	451.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	44,582.50	24,832.50

NOTE.—From the totals above given should be deducted the receipts from the sale of catch crops and from the sale of timber and firewood, if any.

THIRD YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Cleaning 2,500 acres of land, at $5 per acre	12,500.00	
Cleaning 2,500 acres of land, at $2.50 per acre		6,250.00
Assistant manager's salary	2,200.00	2,200.00
Tools	250.00	250.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Depreciation on buildings, track, and water system (10 per cent)	451.50	451.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	16,807.50	10,557.50

NOTE.—From the total should be deducted the value of catch crops, which on forest land should be sufficient to pay the cost of keeping the land clean.

FOURTH YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Cleaning 2,500 acres, at $5 per acre	12,500.00	----------
Cleaning 2,500 acres, at $2.50 per acre	----------	6,250.00
Assistant manager's salary	2,400.00	2,400.00
Tools	200.00	200.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Depreciation on buildings, track, and water system (10 per cent)	451.50	451.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	16,957.50	10,707.50

NOTE.—From this year on there will be no catch crops of importance.

FIFTH YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Cleaning 2,500 acres, at $5 per acre	12,500.00	----------
Cleaning 2,500 acres, at $2.50 per acre	----------	6,250.00
Assistant manager's salary	2,800.00	2,800.00
Tools	200.00	200.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
4 miles of track	3,100.00	3,100.00
½ mile of portable track	1,380.00	1,380.00
10 cars, at $30 each	300.00	300.00
Depreciation on buildings, 1 mile of track, and water system (10 per cent)	451.50	451.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	21,937.50	15,687.50

NOTE.—On favorable land some nuts will be harvested during the fifth year.

SIXTH YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Cleaning 2,500 acres, at $5 per acre	12,500.00	
Cleaning 2,500 acres, at $2.50 per acre		6,250.00
Assistant manager's salary	2,800.00	2,800.00
Tools	200.00	200.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Depreciation on buildings, track, and water system (10 per cent)	929.50	929.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	17,835.50	11,585.50

NOTE.—The sixth year a half crop of 30 nuts per tree may be estimated. While all the land in the plantation will need to be cleared in the first instance and kept clean thereafter, it will be safe to allow 200 acres for waste land and for that used for buildings, etc., so the crop of nuts for the sixth year from 1,150 acres may be estimated at 1,380,000, which should give 6,900 piculs of copra, worth $34,500, less cost of harvesting nuts and making copra.

SEVENTH YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Cleaning 2,500 acres, at $5 per acre	12,500.00	
Cleaning 2,500 acres, at $2.50 per acre		6,250.00
Assistant manager's salary	3,000.00	3,000.00
Tools	200.00	200.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Depreciation on buildings, track, and water system (10 per cent)	929.50	929.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	18,035.50	11,785.50

NOTE.—This year a full crop of 2,750,000 nuts may be estimated for 1,150 acres and a half crop of 1,380,000 nuts for the remaining 1,150 acres under cultivation, or 4,130,000 nuts in all, from which 20,700 piculs of copra should be obtained, worth $103,500.

EIGHTH YEAR

	On ordinary forest land.	On a coral island.
Rental	$256.00	$256.00
Cleaning 2,500 acres, at $5 per acre	12,500.00	
Cleaning 2,500 acres, at $2.50 per acre		6,250.00
Assistant manager's salary	3,000.00	3,000.00
Tools	200.00	200.00
5 draft cattle, at $40 per head	200.00	200.00
Launch engineer, at $37.50 per month	450.00	450.00
Kerosene, engine oil, cotton waste, for launch	200.00	200.00
Depreciation on buildings, track, and water system (10 per cent)	929.50	929.50
Depreciation on launch (20 per cent)	300.00	300.00
Total	18,035.50	11,785.50

NOTE.—During this year and thereafter a full crop of nuts should be harvested from the entire 2,300 acres, amounting to 5,520,000 nuts, equivalent to 27,600 piculs of copra, worth $138,000.

"Mr. J. Shaw Hellier, a planter who has had much experience in Burma and the Malay States has submitted the following figures for establishing a 2,500-acre coconut plantation on an island in the Philippines:

Expenditure first year

Preliminary expenses	$5,000
Survey	100
Rental	256
Clearing 1,000 acres, at $10 an acre	10,000
Seed nuts	1,500
Lining, holing, planting	1,500
Upkeep	5,000
Nurseries	500
Salaries	6,000
Manager's bungalow	1,000
Assistant's bungalow	500
Furniture for 2 bungalows	600
Coolie lines	2,000
Store	500
Water supply	600
Tools	500
Horses	250
Cattle	600
Recruiting	500
Launch	1,500
Upkeep of launch	700
Landing stage	500
Stationery, office	500
Medicines	500
Contingencies	1,000
Total	41,606

Expenditure second year

Rental	$256
Cleaning 1,000 acres	10,000
Upkeep of 2,000 acres	10,000
Seed nuts	1,500
Lining, holing, planting 1,000 acres	1,500
Salaries	7,000
Coolie lines	500
Recruiting	250
Nurseries	500
Tools	500
Cattle	200
Upkeep, buildings	200
Upkeep, launch	700
Stationery	100
Medicines	200
Water supply	500
Doctor	1,000
Contingencies	1,000
Total	35,906

Expenditure third year

Rental	$256
Cleaning 500 acres	5,000
Upkeep 2,500 acres, at $5 an acre	12,500
Seed nuts	750
Lining, holing, and planting	750
Salaries	8,000
Coolie lines	250
Recruiting	125
Tools	500
Cattle	200
Upkeep, buildings	400
Upkeep, launch	800
Nurseries	250
Sationery	200
Doctor	1,000
Medicines	300
Contingencies	1,000
Total	32,281

Expenditure fourth year

Rental	$256
Upkeep 2,500 acres, at $4 an acre	10,000
Salaries	9,000
Recruiting	125
Tools	300
Cattle	200
Upkeep, buildings	400
Upkeep, launch	800
Stationery	200
Doctor	1,000
Medicines	300
Contingencies	1,000
Total	23,581

Expenditure fifth year

Rental	$256
Upkeep 2,500 acres, at $3 an acre	7,500
Gathering, curing crop	3,000
Salaries	10,000
Recruiting	125
Tools	300
Cattle	200
Upkeep, buildings	400
Upkeep, launch	800
Stationery	200
Doctor	1,000
Medicines	350
Curing house with machinery	10,000
Contingencies	1,000
Total	35,331

Expenditure first year	41,606
Expenditure second year	35,906
Expenditure third year	32,281
Expenditure fourth year	23,581
Expenditure fifth year	35,331
Total	168,705

$168,705 equals $67.50 per acre.

Hereafter expenditure may be put at $25,000 per annum.

Revenue sixth year

1,000 acres at 20 nuts per palm	$800,000
1,000 acres at 10 nuts per palm	400,000
Total	1,200,000

1,200,000 nuts equal 5,454 piculs copra, at $5 per picul, $27,270.

Net income, $2,270.

Revenue seventh year

1,000 acres at 35 nuts per palm	$1,400,000
1,000 acres at 20 nuts per palm	800,000
500 acres at 10 nuts per palm	200,000
Total	2,400,000

2,400,000 nuts equal 10,909 piculs copra, at $5 per picul, $54,545.

Net income, $29,545.

Interest, 45 per cent.

Revenue eighth year

1,000 acres at 50 nuts per palm	$2,000,000
1,000 acres at 35 nuts per palm	1,400,000
500 acres at 20 nuts per palm	400,000
Total	3,800,000

3,800,000 nuts equal 17,272 piculs copra at $5 per picul, $86,360.

Net income, $61,360.

Interest, 57 per cent.

Revenue ninth year

1,000 acres at 60 nuts per palm	$2,400,000
1,000 acres at 50 nuts per palm	2,000,000
500 acres at 35 nuts per palm	700,000
Total	5,100,000

5,100,000 nuts equal 23,181 piculs of copra at $5 per picul, $115,905.

Net income, $90,905.

Interest, 64 per cent.

Revenue tenth year

2,000 acres at 60 nuts per palm	$4,800,000
500 acres at 50 nuts per palm	1,000,000
Total	5,800,000

5,800,000 nuts equal 26,363 piculs of copra at $5 per picul, $131,815.

Net income, $106,815.

Interest, 75 per cent.

Afterwards the crop should be about 6,000,000 nuts annually—27,272 piculs of copra, at $5 per picul, $136,360. Giving a net income per annum of $111,360.

Dividend, 87 per cent.

NOTES ON THE ABOVE ESTIMATE

“ ‘In my opinion an island or peninsula is eminently suitable for coconut growing; either usually contains the essential condition as to soil, water, etc. Besides which they often offer the following special attractions:

“ ‘(1) Light clearing.

“ ‘(2) Small upkeep. The land not growing rank vegetation.

“ ‘(3) Fencing small amount or none.

“ ‘(4) Drainage little or none on account of the nature of the soil and the lay of the land.

“ ‘(5) Little or no roading, the soil being sandy would allow of wagons being drawn over it at all seasons and the nuts might largely be collected by water.

“ ‘(6) Probable exemption from disease, animals or thieves.

“ ‘Against these advantages one must put the following:

“ ‘(1) Purchase and upkeep of launch, boats, etc.

“ ‘(2) Extra expenses in obtaining good fresh water.

“ ‘(3) Possible extra cost of labor and things on account of isolation.

“ ‘There are many advantages in running a proposition of this sort on a large scale. If, say, 6 blocks of 2,500 acres were taken up adjoining each other, this would allow of an oil mill being put up to good advantage. Large savings can be effected by the management. It allows of a thoroughly experienced planter being engaged as general manager, which is absolutely essential.

“ ‘In these estimates I have reckoned on 40 palms to the acre, planting 30 by 30 will give 48. I have taken 220 nuts as making a picul of copra.'

"It will be noticed that in the above estimate Mr. Shaw Hellier allows for more than twice as many seed nuts as does Mr. Worcester—150,000 against 66,000; the former runs his rows about 9 by 9 meters (30 by 30 feet) while if the latter provides only 66,000 nuts for the 2,300 acres the rows would have to be about 12.2 by 12.2 meters (40 by 40 feet). In other words Mr. Shaw Hellier allows for 48 palms per acre against Mr. Worcester's 27—an increase of 77 per cent. In the writer's opinion the planter may take 120 trees per hectare (50 per acre) as the regulation number, though if he does not make a rather strong point of secondary crops in the young groves he may put as high as 65 or 70 trees per acre without crowding them for the first twenty-five years. If the planter finds that this quotum per acre is a little too much, the light-crop trees may be thinned out just as individual rubber and fruit trees are tapped to death or weeded out to make room for the more prolific individuals. In passing, we must recognize the fact that there are many groves in the Philippines with a stand of fully 500 trees per hectare (200 per acre) and we are forced to admit that at even *ten nuts per tree* on an average, the total may be in excess of that from a well spaced plantation yielding 80 to 100 nuts per tree; against the modern planter's protest of bad principle and short life of the old-style grove, the Filipino planter can offer the irrefutable argument of little or no cost of upkeep and a comfortable income.

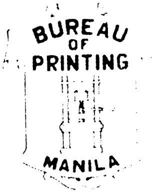
"While nearly every seed nut, if well selected, will give a tree worth planting, the wise superintendent will plant only *vigorous* seedlings; he will likewise have on hand a moderate quantity (say, 10 per cent) of stock in the nursery for 'supplies' in case of the death of some of the plants at the time of transplanting; in other words, he will allow about 120 seed nuts for every 100 propective palms in the grove.

"Mr. Shaw Hellier allows for 220 nuts per picul[1] of copra, while Mr. Worcester allows for only 200. Both these estimate are too low, at least for nuts from the young trees; unless the trees are in an unusually vigorous condition and well spaced, the planter will do well to allow for 275 to 325 nuts per picul of well-dried copra; after long droughts as many as 500 and even more are required. Samoa and German East Africa reckon 7,000 nuts to the ton, or well over 400 to the picul; 6,000 is probably about the average for the world."—(Bulletin No. 25, "The Philippine Coconut Industry," by O. W. Barrett, formerly chief, division of horticulture, Bureau of Agriculture, Philippine Islands.)

---

[1] A Philippine picul of copra weighs 139 pounds. About 16 piculs make 1 long ton.

Further information on this subject may be obtained from the director-general of the Philippine Exposition Board, Panama-Pacific Exposition, or by application to the Director of Agriculture, Manila, P. I.


BUREAU
OF
PRINTING
MANILA

UNIVERSITY OF MICHIGAN
3 9015 00107 8511

THE UNIVERSITY OF MICHIGAN

DATE DUE